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Virtualization of business processes. Opportunity or necessity?

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Abstract: Changes in theory and practice of management is accompanied by changes in technology and society. The use of modern technologies, including the Internet, gives a new dimension to business relationships with customers. In contrast to traditional mass media, the Internet has become a space to allow for multilateral communication, searching for information, making transactions, and even co-creating value. Companies are increasingly building relationships using the Internet, since it provides them with an opportunity to achieve measurable benefits, such as the development of innovative business models, cost reduction and the acquisition of new customers. This article is an attempt to show the benefits of virtualization of business processes and implementation of e-business solutions. It is also an attempt to answer the question of how to use the Internet in the process of delivering value to customers, so as to increase the value of the business and generate benefits for shareholders.

Keywords: e-business, customer, communication, management, information

1. Introduction

Information and communications technology (ICT) is a very important element of communication and includes such media as the Internet, wireless networks, mobile telephony and any other means of communication and technology that enable the processing, collection and transmission of data in electronic form. The first occurrence of the term information and communications technologies was recorded in Stevenson's work, published in the UK in 1997 (Stevenson, 1997), while in Poland, the written form was first reported in 2000 in Polish Telecommunications material.

It is now recognized that the information society is one in which there is free access to ICT. More than half of economically active people are employed in information processing, and

most citizens use ICT in work, education, communication, entertainment and contact with public administrations.

The development of modern technology enables the realization of services using information technology (IT) devices. An important element of this process is not only the enlarging of the list of services offered through electronic means, but also to ensure a high level of data security during transmission, and facilitating the use of new technologies by all citizens, irrespective of their place of residence, age, education level or disability.

The use of modern technology to provide services carries many risks. The variety of operating system platforms and mobile devices, their widespread use, and insufficient knowledge about the real dangers for users, result in incorrect configuration of devices and applications and improper responses to system messages (which are often ambiguous and confusing). Computer systems are difficult to test on a large scale in the real world, therefore only after implementation are they subjected to performance tests, and unfortunately the results are not always satisfactory.

2. Research Methodology

The dynamics of the development of the information society and the steady growth of the electronic services sector in Poland means that there is a great need for theoretical and empirical research in this area.

The aim of this work is to present the importance of ICT in the field of business and economy. The focus was on, inter alia, new dimensions of communicating specific value and the development of good relationships with business partners. The benefits of implementing e-business solutions are presented. In addition, attention was drawn to certain aspects of virtualization for the development of e-commerce. The methods used in this work include the study of literature and source materials in electronic form, as well as observation and analysis of case studies. The study method used was descriptive analysis based on extensive study of the literature.

3. New dimensions of communicating and forming relationships with customers

The concept of "information and communication technology" is often used as a synonym for expanded information technology, but it is a more specific term that stresses the role of unified communications (Cloud, 2013) and the integration of telecommunications (telephone lines and wireless signals), computers and software necessary for businesses, middleware, as well as storage and audio-visual systems, which allow users to access, store, transmit and process information (FOLDOC, 2013).

Information and communication technologies cover a wide range of technologies enabling the manipulation and transfer of information. The conceptual scope of these technologies includes all communication media (Internet, networks, bluetooth, fixed line, cellular and satellite technologies, audio and video communication, radio, television, etc.) and the media for the recording of information (memory sticks, hard drives, CD / DVD, tape, etc.), as well as equipment for processing (PCs, servers, computer networks, etc.). In addition, information and communication technologies also include a whole range of applications and enables the implementation of complex systems and data processing at a higher level of abstraction than the hardware (<http://www.eadministracja.pl> 2013). The term "ICT" is used interchangeably with the term *Infocommunications*. In reality, *Infocommunications* means the expansion of telecommunications and information processing and the support of current functions on the basis of common electronic technology (Sallai, 2012: 5-15).

Interaction with customers pose new challenges and opportunities that arise through the use of modern technologies. Technology provides two-way remote communication between the company and customers. Customers can remotely experience products and services, participate in their personalization, as well as form and develop consumer communities by logging into virtual platforms to search for and disseminate information.

One dimension of virtual resources is the possibility of integration within business relationships, structuring and managing dynamic relationships in the network with the aim of gathering and coordinating the resources needed to deliver value to customers. Companies can come into possession of critical resources from the market, and effectively cooperate with partners by combining complementary skills and focusing on key competencies.

Another dimension concerns the possibility of connecting and utilizing knowledge found within and outside the organization, making it the driver of value creation and determinant of the

effectiveness of the organization. Creating conditions for a virtual community means creating a mechanism for the collection, validation and recognition of knowledge and experience, which is considered an important resource for the entire organization. Involving experts from multiple locations allows for the interpretation of unforeseen events. At the same time, the challenge is rewarding and motivating "scattered" experts, as they are the real sources of knowledge.

T. L. Friedman argues that we are now entering a period of globalization 3.0, which is characterized by a decrease in the size of the world. Owing to computer technology, nations and continents that are geographically far apart have become very close to one another in terms of communication. Friedman claims that the cumulative importance of these factors results in the effect of *triple convergence*: a critical mass of enabling technologies, individuals and organizations with sufficient ability to use these new platforms and the sudden appearance of more than three billion people from the emerging economies of the world on the new "fairer pitch" of the global economy (Fung, Fung and Wind 2008: 25-26).

According to T. L. Friedman, this "flat world" creates the ideal conditions in which companies can use computer technology to combat obstacles faced in the course of running a business (Friedman, 2006: 224). The global market allows for the optimization of the use of tangible and intangible resources, and the migration of workers in the framework of a unified European market or the outsourcing of services only confirms the functioning of this process.

The web plays an important role in the modern economy, because it has changed the attitude companies have towards competence. In e-business, individual enterprises no longer focus on protecting their own know-how, but instead focus on how to use the competences of other partners. On the web, one can access resources that they do not necessarily have to own. If all partners provide access to their own resources, added value is created. It can therefore be argued that there is a change among companies in the approach to resources, competences and attaining added value in the global economy, from a „company-centric” to a „web-centric” system (Prahalad, 2009: 29).

Enterprises on the web are characterized by the specialization of their operations. There are many benefits to this approach, such as higher product quality, higher production capacity, expanded distribution, a greater customer base and lower risk. By dividing the process of manufacturing a product among separate companies, the risk is also shared. If the company is only engaged in the production process, it is solely responsible for the quality of the product and

its packaging. It does not bear the risk of the sale, transport, or storage of the product. Risk sharing is an important factor in inducing companies to network, because lower risk means lower costs.

Currently, it is difficult to imagine a modern enterprise not using computer technology. Computers have become a useful tool in virtually every aspect of life. This is because of all the new challenges people face every day that they cannot resolve on their own. The computer also assists people in performing tasks that would otherwise consume massive amounts of time, a resource that is extremely valuable in today's world. The information systems that support computers play a significant role in the success of enterprises. Information systems are a source of information that satisfy the needs of senior management. Satisfying these needs is associated with quantitative and qualitative demand for knowledge and information.

Production processes and the information systems associated with them are crucial for the management of modern organizations. There is no doubt that one of the essential conditions for the development of the organization is having the appropriate knowledge to enable the study and development of processes occurring in the organization's environment, and it is necessary to use information technology when making important decisions.

Use of the Internet to develop relationships with customers makes customer differentiation more visible. Apart from the acquisition of products, customers also place product reviews online, promoting or discrediting the company. These behaviors also occur outside the Internet, but in a medium of this type, they are more visible because of the greater range and longer time horizon of the impact of published content.

It is important that relationships with customers be perceived through the prism of the business model. To improve relationships with customers, companies often enhance their product portfolio by forming alliances with other (sometimes competing) firms, and acquiring companies in other stages of the value chain. They do this in order to create a so-called ecosystem, expanding the business model so that the client can easily use a wide range of values offered by the company, without coming into contact with the offers of competitors.

Another factor increasing the rationality analysis of companies on the Internet through the prism of the business model is the convergence of industries, where four, five or six ecosystems dominate the Internet (Google, Apple, Microsoft, Ebay, Amazon, Facebook), (Simon, Joel, 2011). Similar oligopolistic tendencies can be observed on the Polish market, where there are

several groups of companies acquiring competitive or complementary entities. As a result, companies can offer the customer a broad, complementary range of values.

A popular concept in the IT environment is Web 2.0. This can be defined as a kind of online venture that, to a large extent, uses content created by users and the interactions between them.

Findings of a survey conducted in June 2009 by the consulting firm McKinsey, on the use of Web 2.0 in enterprises (McKinsey Report, 2009) are quite interesting. The study takes into account the opinions of 1,700 executives of companies diversified in terms of sectors and regions of operation. The study's authors singled out three areas of use of Web 2.0 in enterprises: internal processes, customer relations and cooperation with suppliers and partners.

Research shows that the greatest benefits of using Web 2.0 for internal processes resulted from faster access to knowledge, communication, and reduction in costs for expensive journeys. Web 2.0 solutions have helped to strengthen relationships with customers, indicated by: better knowledge of the company's offer, consideration of the offer when selecting products/services, conversion, satisfaction and loyalty. Respondents also declared benefits in terms of reducing the cost of marketing, support and travel. Another interesting fact is that one quarter of respondents said that because of Web 2.0 solutions in their companies, the period for the introduction of a product or service on the market was greatly shortened.

In turn, the dominant advantages of Web 2.0 in the area of cooperation with suppliers and partners was faster access to knowledge, reduced communication and travel costs, as well as higher satisfaction with suppliers, partners and external experts.

Respondents who declared benefits in the area of customer relations are those who use blogs and social networks the most often, making it easier for them to communicate with customers and receive feedback from them. According to the authors of the report, success in the implementation of Web 2.0 solutions results from their inclusion in the natural process of user activity. Long-term use of these solutions occurs when the motivation to use them is not only financial. These include the desire to build reputation and gain recognition by others and receive high ratings from other users. The main beneficiaries of the benefits of Web 2.0 technologies in all three areas were companies in the field of information technology and companies which offered services to institutional entities. Benefits were rarely declared by representatives of manufacturing companies or those offering financial services.

4. Benefits resulting from the implementation of e-business solutions

A survey conducted in Poland in May 2012 by the Public Opinion Research Centre shows that more than half of Poles use the Internet at least once a week, and the most popular services include e-shopping (72% of respondents), e-banking (60 %) and listening to the radio (31%) (Feliksiak, 2012). Of those who do use the internet, a majority (64%) use wireless connections, 97% use the internet at home, and 45% at work. Over 18% of respondents have placed homemade videos or photos on the web. Poles are generally enthusiastic about new technology, but as many as 37% of respondents do not plan to use the Internet in the near future.

In 2012, there were 8,7 billion units allowing access to the internet; in 2016 the number will be 10 billion, and in 2020- 50 billion. Twelve million people used mobile devices for e-payments in 2012 (Report, 2013). The range of services provided through mobile phones is steadily increasing, such as the ability to pay for purchases in shops.

Table 1 shows the benefits of implementing e-business solutions. Key benefits include: communication with business partners and customers, integrated exchange of information, the ability to place orders and conduct sales via the Internet, the reduction of costs and prices, etc.. The methods and techniques to implement these solutions are also presented.

Table 1. The objectives of the implementation of e-business solutions in the field of processes

Processes	Benefits of the implementation of e-business solutions	Methods and Techniques
Internal logistics and production preparation	Communication with business partners and customers. Information about demand flows directly from customers, and based on this information the company can organize production processes and inventory management.	Internet, ERP, WMS, PRM
Production	The integrated exchange of information between all departments involved in the manufacturing process. Possible customer participation in product design. Increases the efficiency of technical processes of production.	Internet, CAD, ERP, WMS, TQM, CIM
External logistics	Orders and trade documentation can be sent in electronic form. Order processing takes place in real time. Sales are very often conducted via the Internet. The customer can track the status of the shipment. Reduction in costs and prices, acceleration of the processing of orders.	Internet, EDI, e-commerce
Marketing and Sales	Direct sales channels using electronic media. By using the company website, the customer has the ability to configure the product to his needs. Dynamic price quotes.	CRM, e-commerce

Source: own research.

E-business solutions are increasingly being used in many industries. They allow for the tracking of specific business processes in real time and increase productivity. Processes carried out in the company are a reaction to the flow of information. Information often initiates movement of goods, enables the monitoring of specific processes and provides proof of their completion. These processes occur in each company (organization), regardless of its place in the logistics supply chain.

Information systems, whose task is to support the processes occurring in the company, are complex and often characterized by a modular structure. An important issue is the mobile form of contact with the system, which results in easy access to detailed information in real time. Full control of certain economic processes and easier management of available resources not only

improve the work done by reducing errors, but also improve efficiency. There is also a growing interest in cloud computing software. For companies that invest in mobile devices, cloud computing allows employees to access data from virtually anywhere in the world. Sales representatives can present products in a modern form and easily forward details to customers.

Virtualization of business processes is seen as a method of accelerating the growth of competitiveness through the use of production capacity and other competencies of cooperating entities (Perkowski, 2009: 52). It represents the strategic optimization of the value chain. This optimization is done by shaping the business model through the balancing of the physical and virtual aspects of management. It is a response to the need for rapid accumulation of resources and skills without simultaneously burdening the organization with rigid structures.

The Internet, as an environment which allows for easy comparison of offers, access to many suppliers and for the exchange of information between consumers, is becoming an extremely competitive market, bearing many signs of perfect competition. When developing a company's marketing resources, competitive pressure can be reduced by diversifying, by imposing exit barriers, etc.. These types of activities in the field of customer relations affect how the company competes in the market.

5. Product development in the digital age

Product digitization is the total or partial conversion of a product from material to digital, converting atoms to bits. This process occurs in different ways. In the case of airlines, only part of the product is subject to digitization, where the ticket ceases to exist in traditional material form, and begins to function as information stored in a computer system.

Products that are fully digitalized (e-products) are characterized by zero marginal costs. This means that the cost of producing the product is only endured once; the cost of producing further copies of this product is zero (or near zero). Digitized products can easily be distributed through the use of the Internet, which reduces transaction costs for the customer (time, effort). Full digitization is often the transformation of product form. This occurred with music tracks which were originally inseparable from the carrier (CDs, cassettes and so on.). The digital recording of music, including mp3 format, allows for the complete separation of value for customers from traditional media. At the same time, the product in digitized form still requires

material infrastructure to provide the customer value associated with it. A similar situation occurs in the case of traditional books and e-books.

One dimension of virtual products is digital services (e-services). Examples of e-services are Internet banking, online auctions, online payment systems, search engines, online games, Internet tools (e.g. task management tools), web statistics, as well as portals and internet editions of newspapers (Bochińska and Palczewska, 2011).

A second dimension of virtual products (or services) is the enrichment of information. The product itself does not need to change its character, it just becomes encapsulated in a layer of information increasing its value. Enrichment is a common form of information value innovation on the Internet. It allows producers to provide additional value to customers, to better fulfill needs. An example of this process is the enrichment of courier services with the ability to identify the current location of a package.

Often, the two processes of product virtualization, that is the digitization of information and its enrichment, are combined (Czarniewski, 2014: 79-87). The online shop Amazon.com provides virtualization of the products it offers mainly by enriching them with information. In addition to presenting information about a product, Amazon.com provides reviews and evaluations of products that were contributed by customers.

Amazon.com also utilizes product virtualization. Most of the products on offer are in material form. Amazon.com, however, does partial digitization of products - in the case of books, the shop provides scans of the most important pages (cover, table of contents, index, etc..), In the case of music, the shop allows customers to open and play the initial fragment of a CD. The sharing of digitized products in this manner is characterized by significantly limited functionality, but it does help customers in assessing the product and deciding whether to buy it. Amazon.com also offers digitized versions of books in the form of e-books, which can be accessed once customers acquire the company's e-book reader.

6. Virtualization for the development of e-commerce

The growing popularity of virtual solutions is aided by the recently observed (in Poland and around the world) economic slowdown, forcing a reduction in expenditures, including in the area of information infrastructure. More and more companies (especially SMEs) have benefitted

from the transfer of its infrastructure into a virtual environment. The increase in deployment of virtual environments in small and medium-sized enterprises in 2012 (compared to 2011) is estimated at 21%, while for large companies, this value was only 14% (Adelberger, 2012).

For many companies, server virtualization is the best way to save space on their server and maximize efficiency, and is becoming rather common. An interesting solution for many organizations is desktop virtualization, which enables effective management of end users in remote branches (riverbed.com, 2012). In February 2010, results of a survey carried out by Vanson Bourne on behalf of Citrix Systems were published, which stated that by 2014 IT departments would save almost 30% as a result of the implementation of virtual technologies (Citrix, 2010). The survey was conducted among 700 executives from the information technology sector from five countries: Japan, Canada, the United States, Germany and Great Britain.

Many organizations are striving to increase efficiency while reducing costs using cloud-based technologies. The huge amount of data companies accumulate (requiring consolidation and efficient management) is constantly rising - hence the growing interest of companies in moving this data to a cloud. In parallel, there is a growing number of tools and services that enable the implementation of such plans.

Cloud computing, which is based on virtualization, is one of the fastest growing information technologies. It is used by big business, and medium and small companies are increasingly becoming interested in it. Customers are offered modern, distributed information infrastructure, the functionality of which is adapted to their expectations, and they only pay for the resources and services they use. Different cloud solutions have their advantages and disadvantages, so the decision of which to choose is dependent on the specifics of the organization and the services it uses.

For companies that want to quickly launch a service without investing in their own hardware infrastructure, a good solution is a public cloud (access to services and infrastructure located outside the company can be obtained via the Internet). For those who need security and privacy - a better option is a private cloud (using the internal information infrastructure of the company). The decision to place data and services offsite is certainly not an easy one.

7. Conclusion

As confirmed by the above examples, virtual reality has become a real place of residence for internet users, and there is a permanent need among enterprises for the implementation of innovation and creativity in the process of communicating with the target audience. Companies have become subjected to the logic of the virtual world and the characteristics of the technology associated with the idea of hypermedia.

The advent of ICT questioned the traditional ways of doing business, substantially affecting the activities of many companies and institutions. In Polish companies and institutions, hundreds of computer programs are in operation that are not connected in any way. Individual companies and institutions have developed different data collection procedures, and therefore classify assets and keep records in different ways. The disadvantage of the present situation are the high costs of administrating these separate systems, including the purchasing of new licenses or modifying existing programs. For many companies and institutions, starting a central system would increase the automation of administrative and management processes.

The digitization of management processes, the importance of trade and the growth of Internet technology makes the impact of the virtual environment increasingly visible in many areas of economic and social development. Modern information and communication technologies significantly affect access to information resources in the virtual environment. The Internet is a medium that has not only changed the world, but has also changed the way the world is evolving.

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Wirtualizacja procesów gospodarczych. Szansa czy konieczność?

Streszczenie

Zmianom w teorii i praktyce zarządzania towarzyszą zmiany technologiczne i społeczne. Wykorzystanie nowoczesnych technologii, w tym Internetu, nadaje nowy wymiar relacjom firmy z klientami. W przeciwieństwie do tradycyjnych mediów masowych Internet stał się przestrzenią umożliwiającą wielostronną komunikację, wyszukiwanie informacji, zawieranie transakcji, a nawet współtworzenie wartości. Firmy coraz częściej budują relacje z wykorzystaniem Internetu, gdyż dzięki temu osiągają wymierne korzyści, takie jak rozwój innowacyjnych modeli biznesowych, obniżka kosztów lub też pozyskanie nowych klientów. Celem tego artykułu jest próba ukazania korzyści z wirtualizacji procesów gospodarczych i wdrożenia rozwiązań e-biznesowych. Opracowanie to jest także próbą odpowiedzi na pytanie, w jaki sposób wykorzystać Internet w procesie dostarczania wartości klientom, aby doprowadzić do wzrostu ich wartości, a przez to do wzrostu wartości firmy i generowania korzyści dla udziałowców.

Słowa kluczowe: e-biznes; konsument; komunikacja; zarządzanie; informacja.